FOUNDED IN 1905 BY
LEON BARRITT

THE MONTHLY EVENING SKY MAP

OCTOBER • NOVEMBER • DECEMBER 1959
VOL. LIII WHOLE NUMBER 502

THE MONTHLY EVENING SKY MAP

Editor and Publisher
Donald D. Zahner

Associate Editor
Dr. Armand N. Spitz

Contributing Editors
Thomas R. Cave
Walter Scott Houston

Executive Board
Theodore P. Desloge
Hollis E. Suits
Donald D. Zahner

One year: $2.00
Two years: $3.50
Three years: $5.00

(Postage, other than U.S. and Possessions, Canada and Mexico, $1.00 per year additional.)
Published quarterly by Sky Map Publications, Inc., Post Office Box 213 (Clayton Branch), St. Louis 5, Mo.
Application for second-class mail privileges is pending at St. Louis, Missouri.

CONTENTS

1909 - 1959: An Editorial 3
Colors in the Sky — Stuart L. O'Byrne 4
Editorial Announcement 5
October Total Eclipse 6
The Telescope Maker — Thomas R. Cave 7
The Sky for October 8
The Sky for November 10
The Sky for December 12
Moonwatch 1959 14
Pinhole Sunspots — Walter Scott Houston 14

(The cover photograph was taken June 30, 1954, by Barbara Perkins, and was reprinted through the Courtesy of the Yerkes Observatory, University of Chicago.)

1909-1959

This issue of **The Monthly Evening Sky Map** completes its 50th year of publication as a magazine. You will allow us, therefore, our editorial prerogative of striking a Janus-like pose and taking a brief glance into the past and into the future.

In looking backward, we face a commanding heritage. **The Monthly Evening Sky Map**, in its rather humble and unassuming way, has possibly introduced more people to the stars than any other single publication. Originally founded in 1905 as a nationally syndicated newspaper feature, the **Sky Map** grew so quickly in popularity that Leon Barritt began publishing it as a magazine in 1909.

The new magazine was quick to gain an international audience, filling the great void between a curious public and the mysterious, mountaintop world of the astronomer. Barritt, an editor and artist by profession, retained S. A. Mitchell, later to become known as an eclipse authority and director of the Leander McCormick Observatory, as his technical editor, and continued to receive regular contributions from his original colleague, Garrett P. Serviss.

In the years until Barritt's death at the end of the 1930's, the pages of the **Sky Map** benefited from the contributions of many famous astronomical names—E. E. Barnard; the Pickerings, both amateur and professional; William Tyler Olcott; W. W. Campbell; E. B. Frost; R. G. Aitken; and, of course, Leon Campbell.

We owe a debt of gratitude to Mrs. Maria O'Neill Barritt and Mr. Irving L. Meyer for their success in guiding the magazine to its first half century of publication. It is truly a monument to the vision and effort of its founder.

But now we turn and look to the future. The skies are very much the same; Leon Barritt and Garrett Serviss would have noticed little change. But the times have changed, as times do. Interest in the heavens is at an all-time peak, and crowds throng city parks to glance through rows of amateurs' telescopes. Shelves sag with popular books on astronomy and magazine pages bulge with enticing advertisements of shiny new telescopes.

Satellites tumble above us—we are orbiting the sun, brushing the moon, and flirting with Venus.

Yet, we feel that there is a place—somewhere in the middle of all this—for **The Monthly Evening Sky Map**. There is certainly a place in our memory for the old gentleman who first took us out on a summer evening and showed us how to pluck Uranus from a basket of myriad stars. He wasn't even an amateur astronomer — just another subscriber to **The Monthly Evening Sky Map.**

But . . . enough of this looking backward and forward. Let's start looking up!

XUM

COLORS IN THE SKY

By Stuart L. O'Byrne

This splendid portrait of Orion shows how astronomers can detect and measure star colors. Betelgeuse (upper left) is outshone by the other stars in the constellation, although it is nearly as bright as Rigel (lower right). The blue-sensitive film used in this photograph sifted out the red light, left the blue untouched. (Mt. Wilson-Palomar Photo)

A glance at the constellation of Orion in the late fall and winter months quickly shows the pronounced contrast in color between the red star, Betelgeuse, and the blue star, Rigel. During the summer, the color contrast among Vega, Arcturus and Antares is equally apparent. Through studies of star colors, astronomers have obtained considerable knowledge of the chemistry and physics of the stars.

The stars can be classified, or arranged into groups of various colors — red, yellow, white, and blue. This order of grouping is important, as you will see in a moment. Through visual observations of the several colors of stars, it can be demonstrated that without the aid of any complicated spectroscopes or other observatory equipment, it is quite possible for a careful observer to place a star in its proper color class. Now, this applies only to stars of about the third magnitude or brighter — about the brightness of the star that joins the handle and bowl of the Big Dipper. Fainter stars show little, if any color to the naked eye unless they are very deeply tinged. However, field glasses or small telescopes will bring fainter stars within range of your star-color vision.

Problems in Color Work

These colors are seldom obvious, but are usually more or less subtly impressed upon the sparkling white brilliance of starlight, so that paleness is characteristic of star colors. A little practice in watching for and noting these faint tints will develop your ability to see them more easily.

A few stars have colors of considerable saturation. One of these is the star Mu Cephei, a red variable star which lies midway along the southern edge of the square of Cepheus and just outside it. Mu is an extremely red star, yet even in such cases the colors will be described differently by different observers. For example, Mu Cephei was observed by a group of people having no previous experience in astronomical observation, each being asked to name the color of the star as he saw it. They indicated the following colors: yellow, orange, reddish, salmon pink, deep yellow, pinkish orange and coral. They did indeed see this star differently!

But this apparent confusion in color observation need not trouble anyone. An observer with normal eyesight who studies a series of ten or twelve stars chosen at random will be able to arrange them in order of the rainbow colors: blue, white (inserting here those with no apparent color), yellow, orange and red. With practice an observer can even separate the yellow stars into two or three sub-groups such as (1) weak yellow or yellowish-white, (2) plain yellow, and (3) deep yellow or orangish-yellow. That one observer may call a given star by a different color name than another observer is of little consequence if each assigns the star its proper relative position in the color sequence. Thus, our group of beginning color observers—seemingly contradictory in their color choices—would have probably done a good job of grouping as individuals had they observed a number of other stars.

What Colors Show

Your first experiments in fathoming the delicate tints of the stars will be absorbing, but—as in any observational work—you will soon want to make some suppositions about these colors and what they might mean, especially in relation to other facts you notice about these stars.

Now, the physical characteristics of the stars are closely associated with their temperatures, which also affect the color of the light they give off. Incandescent substances such as the stars, which glow because of their intense heat, radiate a light whose color depends on the amount of this heat. The closer a star's color is to blue, the hotter it is. The closer to red its color, the "cooler" it is—relatively speaking, of course. So, the facts become clear—your eyes can be used as a crude but effective stellar thermometer!

So, what can we learn about the stars if we observe not only their brightness, but also their colors?

Astronomers tell us three important things that will help us. First, they explain that most of the brighter stars we see are luminous giants, or even super-giants. "Dwarf" stars, which keep things lively for the astronomers by behaving differently than the others, are really quite abundant, but their feeble light enables us to see with the naked eye only a very few in our immediate neighborhood of space. This simplifies our study of star colors and what they indicate, since we are dealing almost entirely with giant stars.

Second, we find that there is not a great difference in the **total** light emitted by these giants, regardless of temperature (except in the case of very blue stars). Finally, we are told that the hot stars give off much more light, area for area, than do the cooler stars.

So, when we observe a red star that is about the same brightness as a

nearby blue star — Betelgeuse and Rigel, for example — we can reason that the red star must be, on the average, much greater in dimension than the blue star in order to radiate almost as much visible light. Since we also know through the study of double stars that the quantity of matter in most giant stars is about the same, we can safely say that the large red stars must be less dense than the blue stars.

In other words, the red and orange stars are great, bloated shells of cooler material, while the blue stars are comparatively dense and compact gaseous bodies. The stars of intermediate colors have intermediate characteristics, more or less in proportion to their degree of yellowness or whiteness.

More Color Clues

A few additional facts about these giant stars will add extra pleasure to your star color studies. Our sun, for example, doesn't stand up well at all against them. The giants of all colors radiate into space as much light as a hundred or more of our suns. In most cases they're at least four times as massive, and a few of the supergiants have as much as fifty times the quantity of material in them as does our sun. And — while the blue stars are usually only a few times the sun's diameter — the "inflated" red giants are so large that their diameters compare with the **orbits** of planets: millions of times the size of the sun.

Finally — flexing our star-color "muscles" — we can even make some educated guesses as to the comparative distances of various stars we observe. Since blue stars are usually a bit more luminous than red stars, the red stars will be closer to us, on the average, than blue stars of the same **apparent** brightness. Also, the stars of any one color group are generally further distant the fainter they appear to the eye. Blue stars are as distant as yellow and red stars which are one or two magnitudes brighter, while the stars of any one color group are more distant by a factor of two for each one-and-a-half magnitudes they are fainter.

But now we're pushing our luck. After all, with nothing but our eyes, our heads and a few fingertip facts we've been able to sleuth the temperatures of the stars, their sizes, their masses and their comparative distances.

This fall and winter is a good time to start observing the colors of some of the brighter stars in Orion, Taurus, Gemini, Auriga, Andromeda and other conspicuous constellations. The winter first magnitude stars — Sirius, Rigel, Betelgeuse, Aldebaran, Pollux, Procyon and Adhara (Epsilon Canis Majoris) offer some striking color contrasts. As you've seen, you don't really get to know the stars until you know their colors.

EDITORIAL ANNOUNCEMENT

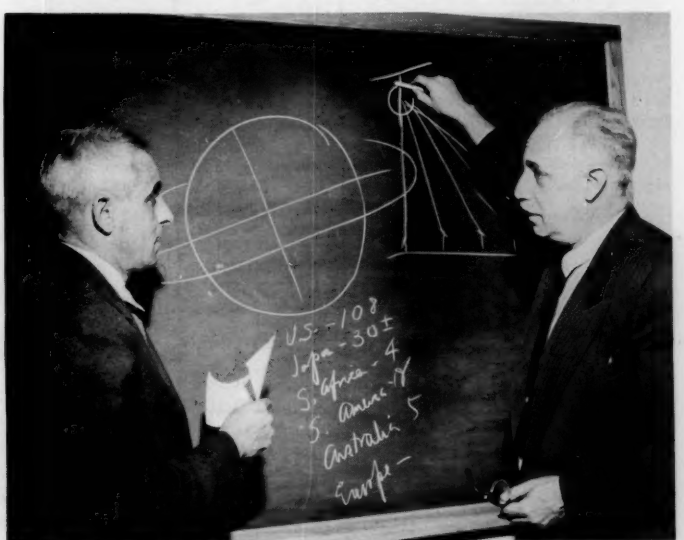
As old subscribers will notice, **The Monthly Evening Sky Map** is now being published under new ownership. Sky Map Publications, Inc., is a St. Louis firm owned and operated by Theodore P. Desloge, Hollis E. Suits, and Donald D. Zahner. Mr. Desloge is a leading producer of industrial films; Mr. Suits a retired businessman; Mr. Zahner has a public relations and editorial background. All three are amateur astronomers who feel that **The Monthly Evening Sky Map,** which will be starting its second half-century as a periodical (see p. 3) has an important place amid today's wave of interest in the heavens. They also realize that the introduction to astronomy is an intellectual experience, and that the study of the stars cannot be "sugar-coated," yet they also feel that the stars can "be brought down to earth."

To assist them in this goal, Dr. Armand N. Spitz, one of the best known personalities in the field of popular astronomy, has joined the staff as associate editor. Lecturer, author, teacher; museum official; a founder of the Astronomical League; designer of the several Spitz planetarium projectors; and, most recently, organizer of "Operation Moonwatch," Dr. Spitz's counsel and contributions are expected to enhance considerably the magazine's potential as an introduction to amateur astronomy.

Several changes have already been made in the magazine's format. It has been expanded to 16 pages and, effective with the next issue, will be published bimonthly—every two months. Present subscribers will continue to receive their copies until the anniversary month of their current subscription.

Effective January 1, 1960, subscription rates will be as follows: One year, $3.00; two years, $5.00; three years, $6.00. For subscriptions outside of the U.S., its Possessions, Canada and Mexico, an additional annual fee of $1.00 will be charged to cover mailing costs. These rate increases are the first since 1939.

Special arrangements for group subscriptions through recognized astronomical societies are available. Please inquire for complete details.



Dr. Armand N. Spitz (right), associate editor, discusses a problem of satellite tracking with Mr. Leon Campbell, Jr., director of the Smithsonian Observatory's Moonwatch program. Dr. Spitz returns to a position he assumed briefly 20 years ago upon the death of Leon Barritt, The Sky Map's former editor and publisher.

XUM

THE OCTOBER TOTAL ECLIPSE

On the morning of Friday, Oct. 2, the sun will rise in partial eclipse on the eastern seaboard of North America. In northeastern Massachusetts and southern New Hampshire the solar eclipse will be total, totality lasting about 55 seconds in the most favorable locations.

However, readers who are not "proper Bostonians" will still have an opportunity to see a partial eclipse if they live in the eastern third of the continent.

Weather conditions permitting, the rising sun will have at least a small slice taken from it in any area east of a line drawn from Hudson's Bay through western Michigan to Tallahassee, Florida (see map).

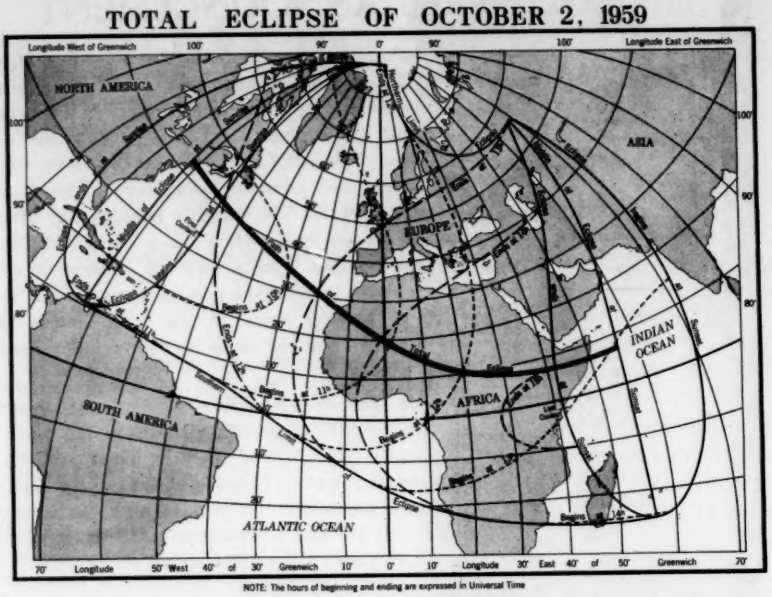
The magnitude of the partial eclipse will increase for viewers the nearer they are to the path of totality in middle New England.

The accompanying map and table covering the circumstances of the Oct. 2 eclipse are reproduced and adapted from the 1959 **American Ephemeris and Nautical Almanac.** Times on the map and in the table refer to Universal Time, which is the zone time at Greenwich. To convert U.T. to eastern **daylight** time, subtract four hours; subtract five hours for eastern **standard** time.

In the tables, "magnitude" indicates the percentage of the sun's disk which will be covered by the moon at the height of the eclipse. At locations for which there is no time entry for the middle phase of the eclipse, maximum obscuration will have passed before sunrise. Find your local sunrise time from an almanac or the newspaper and begin observing a bit in advance. Locate a high point from which to observe the eclipse, and one which affords as low and unobscured a horizon as possible.

Every foot counts under conditions such as these. For observers in the Boston-Salem area, the sun's lower edge will be only one degree (two solar diameters) above the theoretical horizon when totality begins at about 6:50 a.m. EDT. Ground haze, atmospheric diminution and the possibility of coastal fog will all be hazards in an eclipse situation such as this, so it is difficult to suggest exact camera techniques for inexperienced photographers. Fortunately, the wide exposure latitude of today's commercial emulsions offer some room for experimentation.

TOTAL ECLIPSE OF OCTOBER 2, 1959



NOTE: The hours of beginning and ending are expressed in Universal Time

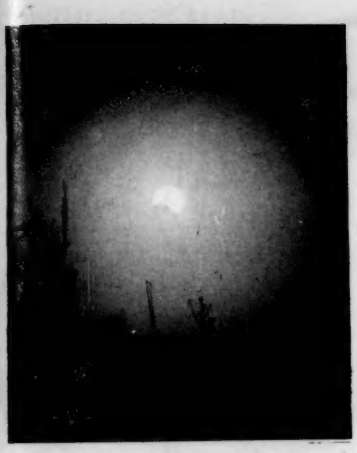
LOCAL CIRCUMSTANCES OF THE ECLIPSE OF THE SUN
OCTOBER 2, 1959

UNIVERSAL TIME

Place	Beginning	P	V	Middle	Magnitude	Ending
				h m		h m
CONNECTICUT:						
New Haven				10 49	0.97	11 50
DELAWARE:						
Dover				.. ..	[0.79][1]	11 47
DISTRICT OF COLUMBIA:						
Washington				.. ..	[0.69][1]	11 46
FLORIDA:						
Tallahassee				.. ..	[0.09][1]	11 36
GEORGIA:						
Atlanta (see Decatur)						
Decatur				.. ..	[0.14][1]	11 40
INDIANA:						
Bloomington				.. ..	[0.04][1]	11 45
Greencastle				.. ..	[0.02][1]	11 45
KENTUCKY:						
Louisville				.. ..	[0.09][1]	11 44
MAINE:						
Augusta				10 52	0.95	11 53
Orono				10 52	0.93	11 54
MARYLAND:						
Baltimore				.. ..	[0.72][1]	11 47
MASSACHUSETTS:						
Amherst				10 50	1.02	11 51
Cambridge				10 50	1.02	11 51
MICHIGAN:						
Ann Arbor				.. ..	[0.26][1]	11 48
Lake Angelus				.. ..	[0.30][1]	11 48
NEW HAMPSHIRE:						
Hanover				10 51	0.98	11 52
NEW JERSEY:						
Princeton				.. ..	[0.87][1]	11 48
NEW YORK:						
Albany				.. ..	[0.96][1]	11 50
Buffalo				.. ..	[0.61][1]	11 49
Geneva				.. ..	[0.74][1]	11 49
Ithaca				.. ..	[0.77][1]	11 49
New York				.. ..	[0.93][1]	11 49
Poughkeepsie				.. ..	[0.94][1]	11 50
Syracuse				.. ..	[0.80][1]	11 50
NORTH CAROLINA:						
Raleigh				.. ..	[0.53][1]	11 43
OHIO:						
Cincinnati				.. ..	[0.18][1]	11 45
Cleveland				.. ..	[0.41][1]	11 47
Columbus				.. ..	[0.30][1]	11 46
PENNSYLVANIA:						
Harrisburg				.. ..	[0.72][1]	11 47
Philadelphia				.. ..	[0.82][1]	11 48
Pittsburgh				.. ..	[0.51][1]	11 47
RHODE ISLAND:						
Providence				10 50	0.99	11 51
SOUTH CAROLINA:						
Columbia				.. ..	[0.35][1]	11 41
VERMONT:						
Montpelier				10 52	0.96	11 52
VIRGINIA:						
Charlottesville				.. ..	[0.59][1]	11 45
Richmond				.. ..	[0.64][1]	11 45

FIRST CONTACT INVISIBLE

[1] Magnitude at Sunrise. Mid-eclipse below horizon.



The above photograph of the Oct. 12, 1958, partial eclipse in Argentina was taken by Marcos A. Severin, an architect of Rafael, Santa Fe Province, and processed by F. Kammerer. Both are members of Amigos de la Urania, the Argentinian astronomical society, Severin used a Tele-Sonnar lens of 5 cm. focal length and this print was enlarged from a Microfilm negative.

Photographers using average equipment should remember that the solar disc is only one-half a degree in diameter, so that, with a lens 4 inches in focal length, the sun will measure about one millimeter in diameter. Imaginative planning, however, coupled with careful processing and enlargement, may produce some interesting and picturesque pictorial effects, and possibly some results of scientific value.

This month's cover photograph, taken by Barbara Perkins during the total eclipse of June 30, 1954, over Rice Lake, Wisc., has value far beyond its scenic qualities. A careful look will show the moon's shadow, extending upward and to the left (north) from the horizon. The moon's shadow during a sunrise eclipse is almost tangent to the earth, and appears as an elongated ecliptical shadow. Good photographs of this phenomenon are rare.

The Monthly Evening Sky Map will be interested in receiving unusual photographs of the October eclipse. The January-February 1960 issue will contain an eye-witness account of the eclipse as observed by a member of an expedition to the Canary Islands, where the sun's altitude will be about 54° and totality will last about 2½ minutes.

The Telescope Maker . . . Thomas R. Cave

The hobby of amateur telescope making had its first organized push about 40 years ago in Springfield, Vermont, where a small group of dedicated amateurs banded together under the leadership of Russell W. Porter. Then Albert G. Ingalls, associate editor of **Scientific American** and a self-styled "telescope nut" himself, learned of Porter's activities and persuaded him to write a series of articles for the magazine.

These articles on the construction of a reflecting telescope, outlining detailed instructions and carrying excellent illustrations, were an immediate success — so much so, in fact, that in 1926 the first edition of **Amateur Telescope Making** was published. Edited by Ingalls and including considerable material by Porter and the Rev. W. F. A. Ellison, another pioneer in the field, **ATM** has seen many reprintings and expansions and has since sired two advanced editions, also edited by Ingalls. Then, in 1927, Ingalls began a monthly column in **Scientific American** on telescope making, a feature which continued until his retirement from the staff a few years ago.

The rest is history—backyards across the country began to bristle with telescopes of varying dimension and design. The Depression of the 30's only challenged the amateurs—mirrors were ground from old portholes and bed casters, Model-T Ford axles became mountings. During World War II amateurs suddenly became professionals, grinding roof prisms for military optics, then reverting to peace-time status to adapt war-surplus optics to their own needs. Today many of these original "telescope nuts" have become leaders of the optical profession or have graduated to esoteric forms of compound optical systems.

But for the beginner, the problem is still the same. He wants to build a telescope which is optically sound and satisfying, but with a minimum of time and money, and he wants the instrument to be compact and portable. This desirable combination of requirements can be fulfilled by anyone with a reasonable amount of patience, a bit of mechanical ability and a dash of native ingenuity.

Most beginners overlook one obvious solution to this problem by sticking too closely to the classic f/8 focal ratio — a focal length eight times the diameter of the mirror. At this focal ratio, a good 6-inch mirror, to be worthy of the name, must be carefully figured to close parabolic tolerances. This often seems to be where the beginner's troubles start. If, instead of an f/8 focal ratio, the novice selects f/11 as his target (66 inches or longer for a 6-inch mirror), he can leave the mirror with a spherical figure and simplify his project by using a Ronchi grating for his testing instead of the usual knife-edge test.

One of the greatest stumbling blocks in making a first mirror is the proper interpretation of the Foucault, or knife-edge, test. Few amateurs, however, run into any difficulty in evaluating the spherical surface of their mirror with the Ronchi test, which shows a series of straight vertical bands if the mirror is accurately spherical. Of course, much can be learned later by examining a finished spherical mirror under a knife-edge test.

At these longer focal lengths, which minimize the aberrations inherent in the shorter lengths, any figure approaching a good sphere should give excellent performance. Also, a very small diagonal mirror can be used, cutting cost and improving contrast of extended images such as the observer encounters in planetary observing. The f/11-plus ratio affords higher powers with normally available eye-pieces, another economy and convenience.

This department will be anxious to receive, evaluate and comment on telescopes made by **Sky Map** readers. Send large (at least 4 x 5) glossy prints and describe construction problems and details.

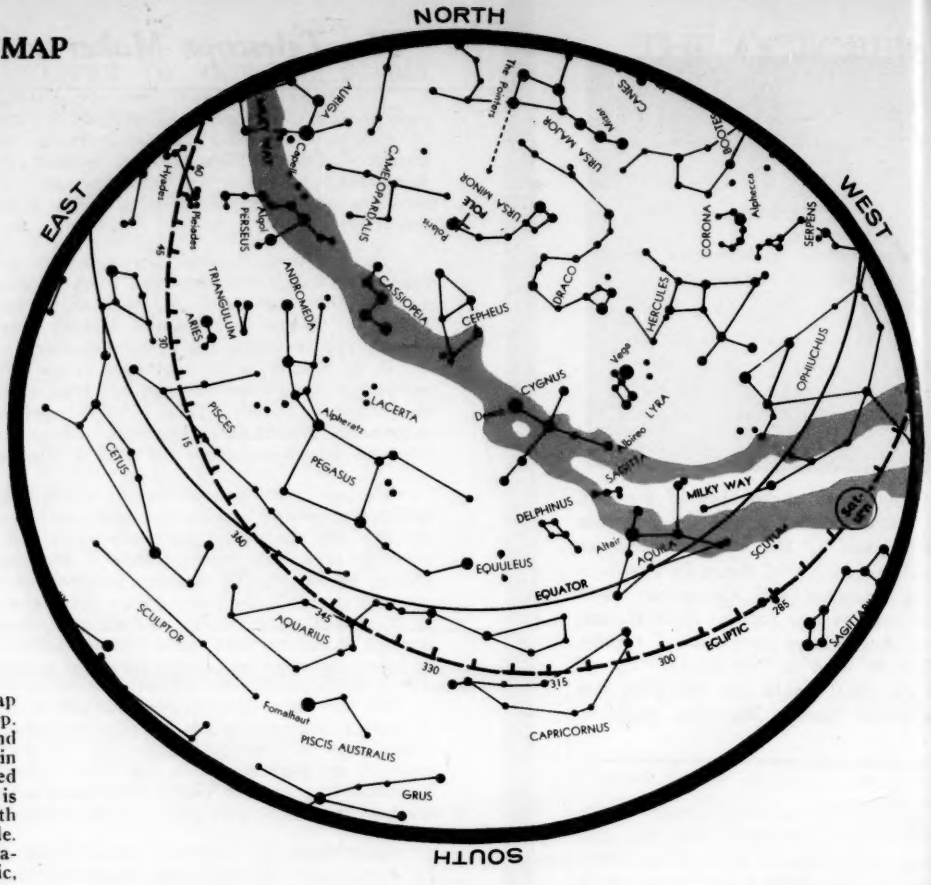
* * *

(Tom Cave is one of the few people who can speak authoritatively in the areas of both optics and observational astronomy. Recognized as a leading planetary observer, Mr. Cave also heads an optical firm which produces highly-rated telescopes and industrial optics. He began as an amateur, however, and remembers the problems of his early days. He hopes to eliminate many of these for his readers.)

XUM

EVENING SKY MAP

FOR OCTOBER



Face south, hold map overhead with north at top. You will see stars and planets as they appear in the sky. Map is designed for 40° N. latitude, but is practical ten degrees north or south of that latitude. Solid line is celestial equator; dashed line is ecliptic, the apparent path of sun and planets.

9:00 P.M., OCT. 1 **8:00 P.M., OCT. 15** **7:00 P.M., OCT. 31**

OCTOBER AMONG THE PLANETS

THE SUN: The sun is in Virgo, moving southeast along the ecliptic until it is nearly 15° south of the equator at the end of October. The sun will be totally eclipsed on the morning of October 2, but totality will only be visible at points in eastern Massachusetts—see page 6 for details.

THE MOON: (Eastern Standard Time)—

New Moon	Oct. 2 at	7:31 a.m.
First Quarter	8	11:22 p.m.
Full Moon	16	10:58 a.m.
Last Quarter	24	3:22 p.m.
New Moon	31	5:41 p.m.

(Two new moons during October!)

Perigee (nearest earth) Oct. 4; apogee (farthest from earth) Oct. 20.

MERCURY: In Virgo, less than 20° west of the sun and of no observational interest.

VENUS: Passed inferior conjunction Sept. 1, then became a morning star in Leo. On Oct. 8 it reaches its greatest brilliancy of the year, blazing forth at magnitude —4.3 some three hours before the rising sun. It will be six times brighter than Jupiter at this time, 15 times brighter than Sirius. But don't start your telescopic observations too early. Venus against a dark sky is a disappointing object; wait for the background sky to lighten a bit so as to minimize the severe contrast effect (but not so long that you lose Venus in the sunrise).

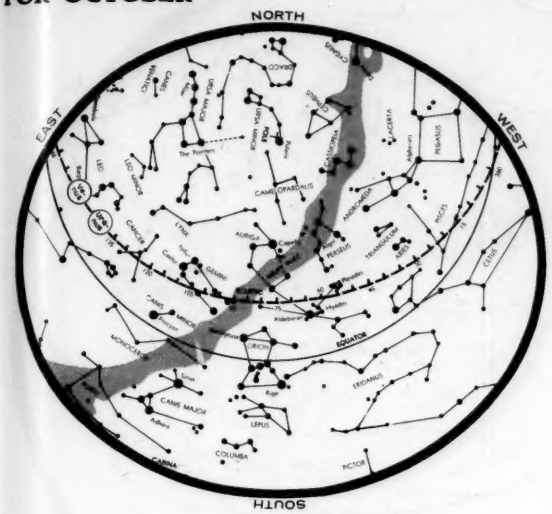
By staring at Venus for a prolonged period, especially when it is bright against a dark sky, you can experience the unsettling phenomenon called "autokinetic motion" by physiologists. Muscular spasms within the eye create the illusion that the bright object is moving. During World War II, this illusion caused night fighter pilots to leave formation and follow Venus, Jupiter or Mars instead of the aircraft tail-light ahead of them. Double tail-lights were installed after awhile, but not before many pilots had lost their way or their lives. Needless to say, autokinetic motion has been responsible for more than one flying saucer report!

MARS: Mars has its moments of glory, but we will have to wait until late next year for one. It is in conjunction with the sun, some 240 million miles from the earth in Virgo.

JUPITER: Moving slowly eastward among the stars of Scorpius, but not quickly enough to escape the beckon-

MORNING SKY MAP

FOR OCTOBER



5:00 A.M., OCT. 1 4:00 A.M., OCT. 15 3:00 A.M., OCT. 31

ing southwestern horizon. This banded giant still deserves a respectful early evening glance, nevertheless. Magnitude —1.4 and showing a disc 30 seconds of arc across.

SATURN: This planet, after Jupiter sets, is the sole remaining planet in the evening sky—a far cry from the stately "gathering of the clan" we enjoyed in July. Saturn's broad ring system is still exposed at an angle of 27° to the plane of its orbit, making it an impressive sight under any optical aid. It deserves at least 3 inches of aperture and magnification of 100 times. Its brightest moon, Titan, should be visible in small telescopes several times during October as it passes through its eastern and western elongations. Still in Sagittarius, mag. 0.8.

Saturn sets several hours past sunset, following Jupiter to its rest below the southern horizon.

URANUS: In the morning sky moving into Leo from Cancer

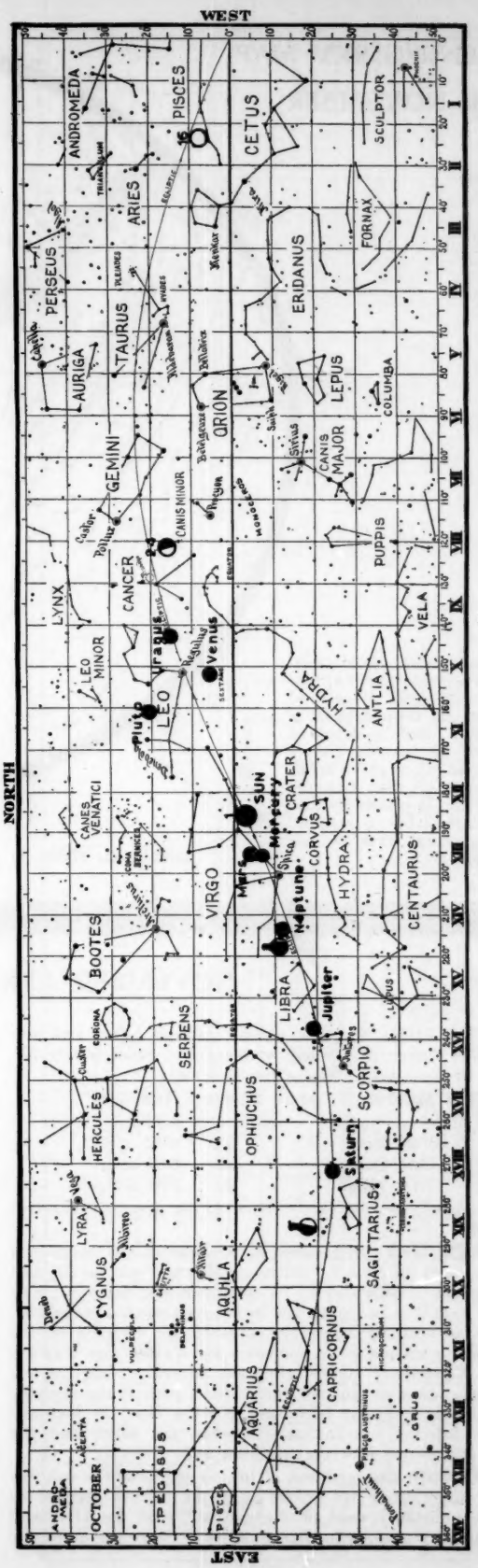
NEPTUNE: Too close to the sun for observation. In Virgo, keeping company with Mercury, Mars and, of course, the sun.

GIACOBINID METEORS

Although experts cannot agree, there is a possibility that the Giacobinid meteor shower, which produced outstanding displays in 1933 and 1946, may return again. The shower is associated with comet Giacobini-Zinner, which itself may become visible in small telescopes later this month.

The shower night of Oct. 9-10 will not be bothered by the first-quarter moon, so begin your watch around midnight. Concentrate on one area of the sky. The meteors, should they appear, will seem to radiate from a point near the head of Draco.

The Monthly Evening Sky Map will be happy to receive Giacobinid shower meteor counts of one hour or longer. State compass direction observed, number of meteors seen, time and duration of period during which counting was done, sky condition, name and geographic location. These reports will be turned over to the American Meteor Society for further study.

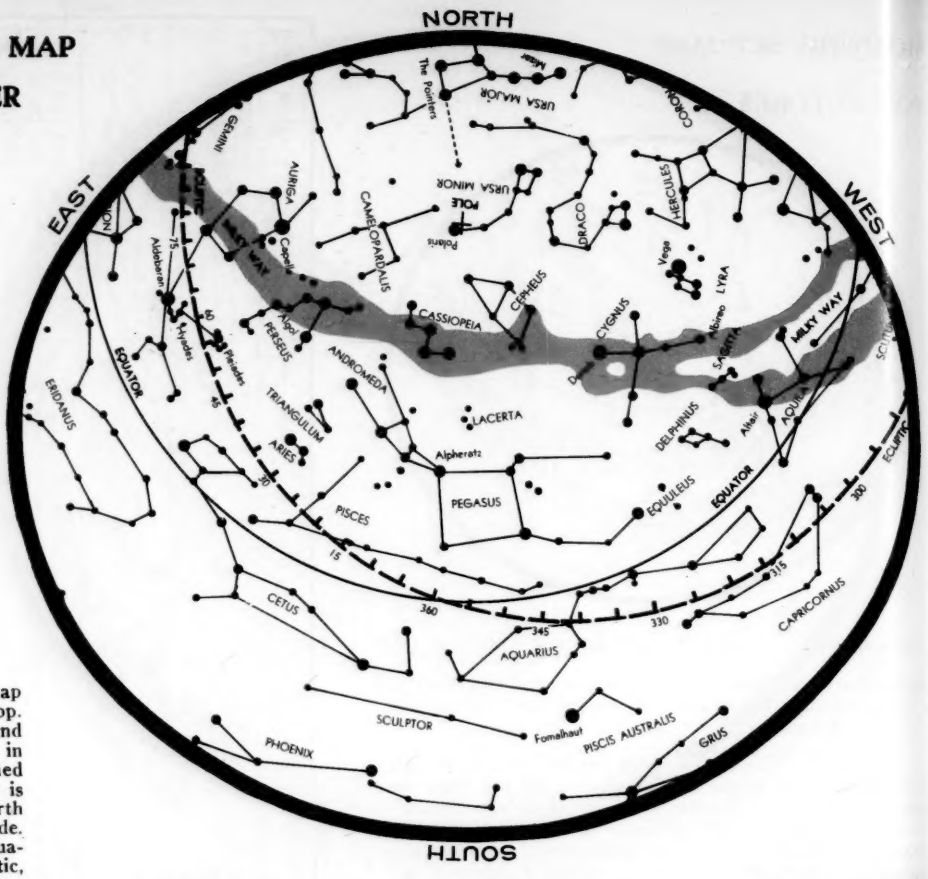


A MERCATOR PROJECTION OF THE STAR FIELD FROM 50° NORTH TO 50° SOUTH OF THE EQUATOR

This chart shows the position of the sun for the first and last of the month, the positions of the planets for the first of the month, and the phases of the moon (dates elsewhere). Objects described by right ascension (R.A.) and declination (Dec.) can also be located. The roman numerals (I-XXIV) are hours of right ascension, which—discounting the earth's rotation—correspond to our longitude. Declination corresponds to earthly latitude, and is measured in degrees (°) north and south of the celestial equator. Thus, the star cluster Praesepe would be located at R.A. 8h 38m, Dec. 20° N.

XUM

EVENING SKY MAP FOR NOVEMBER



Face south, hold map overhead with north at top. You will see stars and planets as they appear in the sky. Map is designed for 40° N. latitude, but is practical ten degrees north or south of that latitude. Solid line is celestial equator; dashed line is ecliptic, the apparent path of sun and planets.

9:00 P.M., NOV. 1 **8:00 P.M., NOV. 15** **7:00 P.M., NOV. 30**

NOVEMBER AMONG THE PLANETS

THE SUN: The sun moves through Libra and into Scorpius during November, arriving at a point nearly 22° south of the equator at the month's end.

THE MOON: (Eastern Standard Time)—

First Quarter	Nov. 7 at	8:23 a.m.
Full Moon	15	4:42 a.m.
Last Quarter	23	8:03 a.m.
New Moon	30	3:46 a.m.

Perigee (nearest earth) Nov. 1, 30; apogee (farthest) Nov. 17.

MERCURY: In greatest eastern elongation (furtherest east of sun) on Nov. 3. Although Mercury will be 23° east of the sun, it will also be 24° south of the equator. You might spot it is Scorpius, low in the southwest after sunset, but it is scarcely favorably situated for viewers in the northern hemisphere. Authorities say it's not true that the great Copernicus never glimpsed Mercury, but anyone who has squinted into the sunset for a peek at the slippery little object is happy to believe it. On Nov. 24 Mercury passes inferior conjunction (between the earth and the sun) and moves into the morning sky.

VENUS: The goddess of beauty continues to rule the dawn hours from her throne in Virgo. Venus reaches its greatest distance west of the sun (47°) on the 11th, still shining with queenly brilliance at —4.1. Since the earth and the sun form a right angle with Venus at the apex, the planets's disk appears half illuminated at this time. It rises about three hours before the sun.

MARS: Mars has passed conjunction with the sun and has moved from Virgo into Libra. Unobservable at this time but on its long trip back to us.

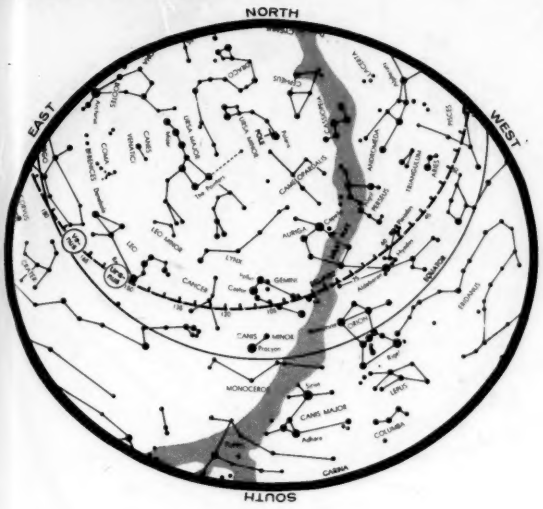
JUPITER: Also too near the sun for observation. Still in Scorpius and only 17° east of the sun.

SATURN: Low in the southwest in Sagittarius and sets two hours after the sun, but its rings are still a thrilling sight in the gathering dusk. Take a moment to bid this lonely wanderer farewell, for it's the last remaining planet in the evening sky. Contemplate the fragile beauty of its rings as they shimmer weakly in the low atmospheric turbulence. Still some 35 seconds of arc across, though Saturn is one billion miles away.

URANUS: Uranus becomes visible in the east after midnight during November, nearly snared in the blade of Leo's Sickle. Moving eastward still, it is about sixth magnitude and is at right ascension 9h 35m, declination 15° N. at the middle of November. An easy object after a few nights of observation, as its motion should give it away. Use binoculars.

NEPTUNE: In Libra, and unfavorably placed for observation.

MORNING SKY MAP FOR NOVEMBER



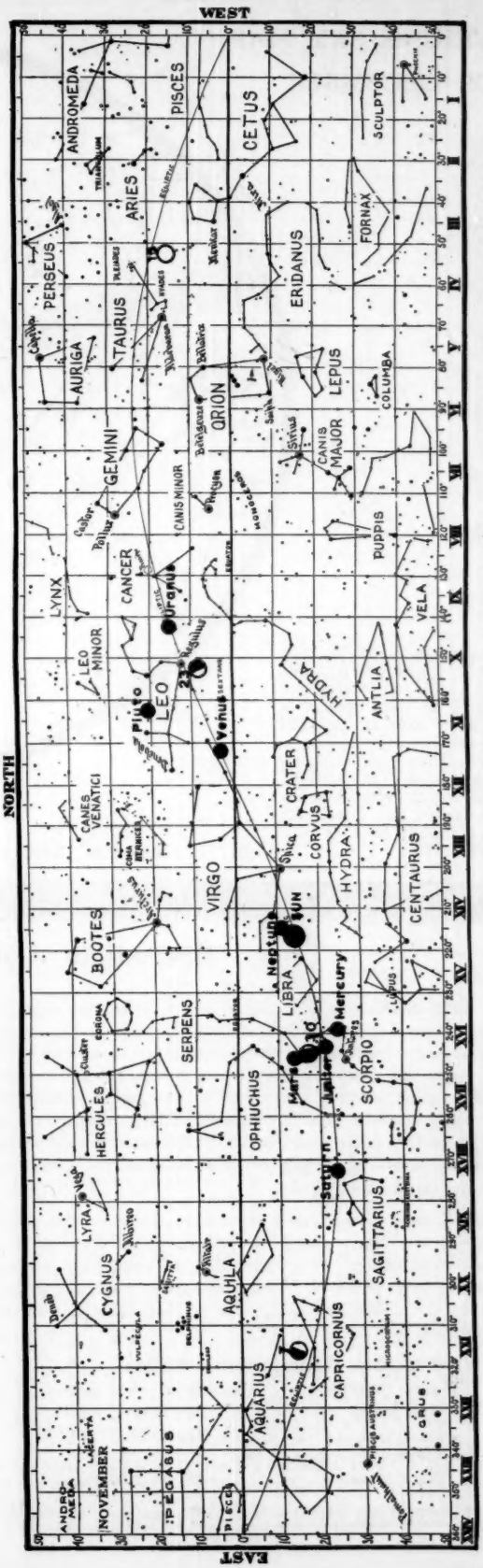
5:00 A.M., NOV. 1 4:00 A.M., NOV. 15 3:00 A.M., NOV. 30

THE PERSEUS CLUSTERS

The Double Cluster of Perseus rides high above late these crisp autumn evenings, a veritable jewel box, there for the taking. Described variously as "gold-dust" and "diamond-dust," this is truly a wondrous pair of galactic clusters. Shapley says that the 1000-odd stars which comprise this double diadem would be evident to "astronomers" observing us from the Andromeda galaxy!

Double Cluster in Perseus (Yerkes Observatory)

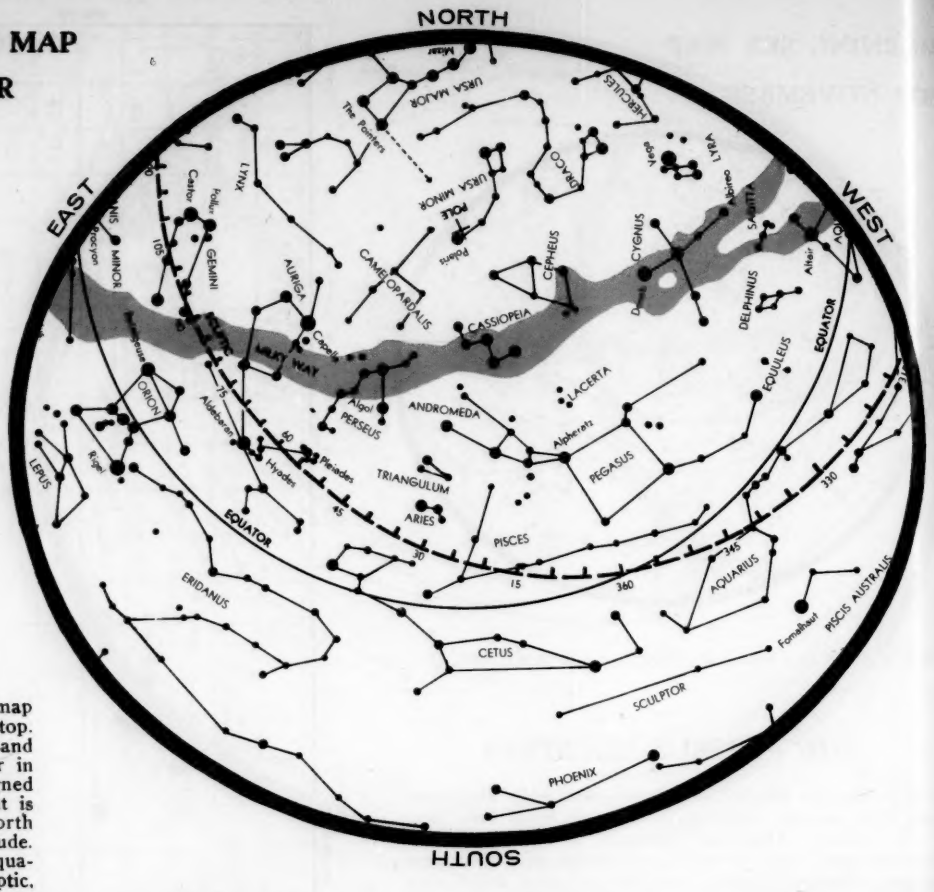
The Double Cluster lies below and to the left of the "W" of Cassiopeia, just across the border in Perseus. Twinkling at us through interstellar dust from some 8,000 light years away, its red and blue supergiants make it a naked-eye object and a telescopic treasure chest.



A MERCATOR PROJECTION OF THE STAR FIELD FROM 50° NORTH TO 50° SOUTH OF THE EQUATOR

This chart shows the position of the sun for the first and last of the month, the positions of the planets for the first of the month, and the phases of the moon (dates elsewhere). Objects described by right ascension (R.A.) and declination (Dec.) can also be located. The roman numerals (I-XXIV) are hours of right ascension, which—discounting the earth's rotation—correspond to our longitude. Declination corresponds to earthly latitude, and is measured in degrees (°) north and south of the celestial equator. Thus, the star cluster Praesepe would be located at R.A. 8h 38m, Dec. 20° N.

EVENING SKY MAP FOR DECEMBER



Face south, hold map overhead with north at top. You will see stars and planets as they appear in the sky. Map is designed for 40° N. latitude, but is practical ten degrees north or south of that latitude. Solid line is celestial equator; dashed line is ecliptic, the apparent path of sun and planets.

9:00 P.M., DEC. 1 **8:00 P.M., DEC. 15** **7:00 P.M., DEC. 31**

DECEMBER AMONG THE PLANETS

THE SUN: On the 22nd the sun is in "the sign of Capricornus," as the soothsayers have it, but of course such well-preserved remnants belong to another age, some 2,000 years ago. The "house of Capricorn," where the sun resides at the winter solstice ("sun still"), has had a change of address during the past 20 centuries. The gyroscopic effect of the earth's polar rotation has made these points along the sun's path -- the equinoxes and the solstices -- precess, or move to the westward.

This motion has caused the winter solstice -- the point at which the sun reaches its farthest point south of the equator and pauses for a moment in its southward movement—to move some 30°. This amounts to a full constellation of the zodiac, so the house of Capricorn is now in Sagittarius.

THE MOON: (Eastern Standard Time)

First Quarter	Dec. 6 at	9:11 pm
Full Moon	14	11:45 pm
Last Quarter	22	10:28 pm
(Merry Christmas!)	25	
New Moon	29	2:09 pm

Perigee (nearest earth), Dec. 28; apogee (farthest), Dec. 14.

MERCURY: It seems to be either feast or famine this year! In July practically every member of the solar system gathered in the evening sky. Now, in December, we are paying the price, for there are no planets visible in the evening sky. Of course, if you're planning to wait up for Santa, you can just have a bone-chilling observing session before dawn.

Mercury is in Scorpius, and around the 12th of December it will be at its greatest western elongation. Look for it low in the southeast at dawn for a few days on either side of the elongation. It will be red and twinkling at magnitude —0.2, but not conspicuous because of its bright neighbor, the sun.

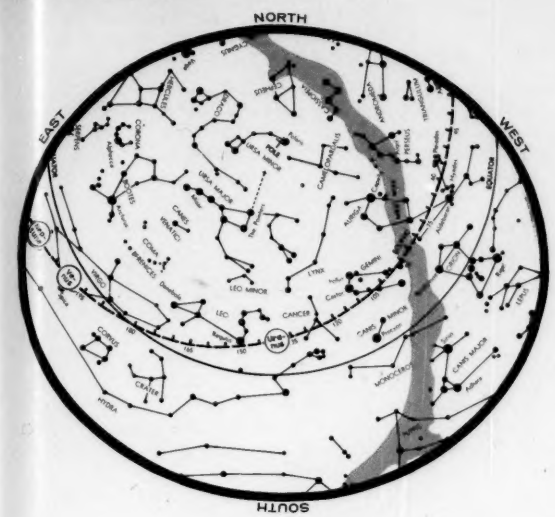
VENUS: Venus, still the reigning morning star, moves eastward from Virgo into Libra, shining at magnitude —3.8 and rising three hours before the sun.

MARS: Still in Scorpius and just past conjunction with the sun. Not observable, but it will be, late next year.

JUPITER: In conjunction with the sun on the 5th and of course quite invisible.

SATURN: Also in conjunction with the sun, but on the 31st of December. Happy New Year!

MORNING SKY MAP FOR DECEMBER



5:00 A.M., DEC. 1 4:00 A.M., DEC. 15 3:00 A.M., DEC. 31

URANUS: Actually, Uranus rises before midnight, spoiling our evening "planetary vacuum." On Dec. 1 Uranus loops into a westward motion among the stars of Leo.

NEPTUNE: A morning object in Virgo, rising a few hours before sunrise.

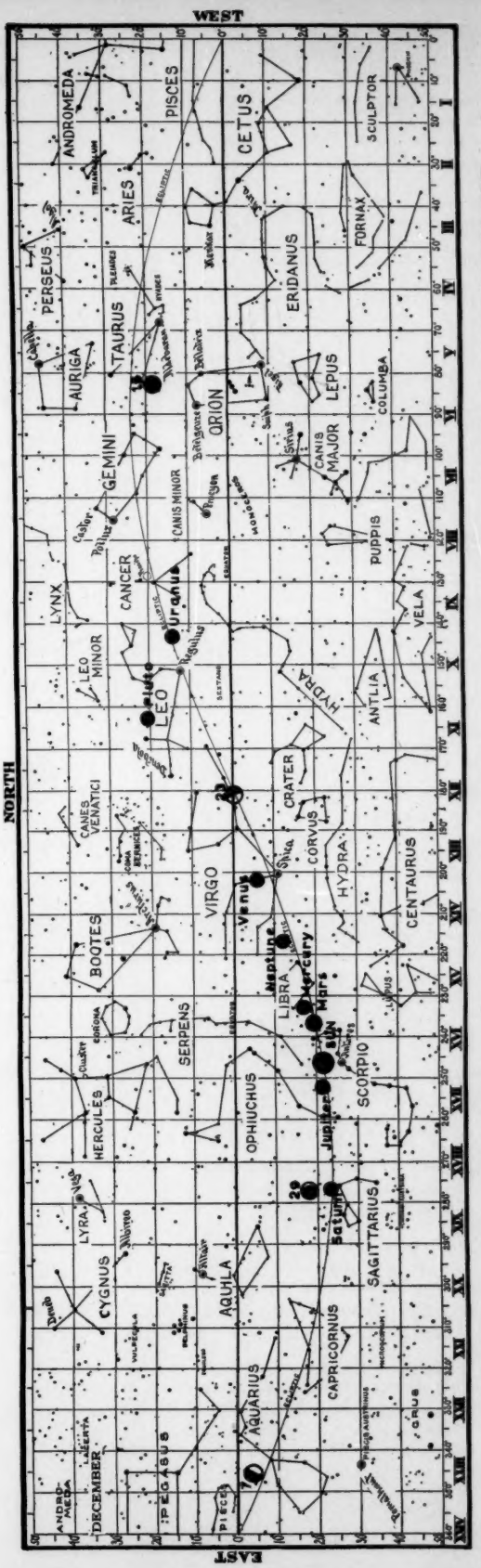
GEMINID METEORS

The nearly full moon should spoil the annual Geminid meteor shower which has its maximum on the 13th. Often averaging 60 meteors per hour after midnight, the milky whiteness of the bright moon will cut down considerably on the number of meteors you might ordinarily see.

SATELLITE STATUS LIST

The following is a list of currently orbiting artificial earth satellites—as of Aug. 15, 1959—and their expected descent dates. These dates are subject to modification as new data becomes available. (From list compiled by Smithsonian Astrophysical Observatory.)

1958 Alpha (Explorer I): 1962?
1958 Beta I (Vanguard I rocket): 100 yrs.
1958 Beta II (Vanguard I): 200 years
1958 Delta II (Sputnik III): 2/15/60
1958 Epsilon (Expl. IV): 8/26/59
1959 Alpha I (Vanguard II): 50 years
1959 Alpha II (Rocket): 50 years
1959 Delta (Paddle-wheel satellite and rocket carrier): no data yet (added to list at publication of this issue).
1959 Epsilon (Discoverer VI): 2 years...
Launched at press time.



A MERCATOR PROJECTION OF THE STAR FIELD FROM 50° NORTH TO 50° SOUTH OF THE EQUATOR

This chart shows the position of the sun for the first and last of the month, the positions of the planets for the first of the month, and the phases of the moon (dates elsewhere). Objects described by right ascension (R.A.) and declination (Dec.) can also be located. The roman numerals (I-XXIV) are hours of right ascension, which—discounting the earth's rotation—correspond to our longitude. Declination corresponds to earthly latitude, and is measured in degrees (°) north and south of the celestial equator. Thus, the star cluster Praesepe would be located at R.A. 8h 38m, Dec. 20° N.

MOONWATCH 1959

Earlier this year we had the pleasant opportunity to visit once more the Cambridge headquarters of "Operation Moonwatch," the visual satellite-tracking program of the Smithsonian Astrophysical Observatory. The offices had removed to a new address down Bond Street hill, below the historic old Harvard College Observatory.

We were trudging along the cobblestone walk aimlessly until we inquired of a little old housekeeper as to the exact location of the new Moonwatch offices. "I dinna know, sir," she replied with a Scotch burr, "but," she added with a gesture of her quavering hand, "they're doin' somethin' mighty queer over there!"

And "over there" it was . . . a large, rambling structure, innocence itself, but packed with mystery for this neighbor woman. We smiled inwardly to know that Moonwatch activities still carried a tinge of the occult. As it did, to quote a possibly apocryphal tale, just two years ago this Oct. 4th, when firemen, summoned by suspicious neighbors, burst into the Moonwatch office to be greeted by another blaze of flashbulbs — the official dawn of the satellite age.

It was that night that astronomers, at least to the public eye, were tumbled from the mountain-tops and into the headlines. And Moonwatch was very much in the middle of this . . . but, as time went on and satellites went up, the public and its press became more sophisticated. An occasional nod of encouragement came forth, but all in all, there was the impression that Moonwatchers had been relegated to the dim, grey limbo of aircraft-spotters or, what is worse, bandage-rollers.

However, the visit to Moonwatch Headquarters allayed any fears. A happy state of **laissez faire** had been reached with the press, and Moonwatch was busy enjoying its solitude.

An indication of the current acceleration of Moonwatch responsibilities is the recent arrival of Dr. Gustav A. Bakos and his appointment as staff astronomer in charge of research activities. With Leon Campbell, Jr., and his able staff, Dr. Bakos will afford Moonwatch the opportunity to increase further the value of its work.

New equipment is being tested, new research programs are being planned, and everyone seems very professional and businesslike. But we couldn't help seeing the twinkle in Leon Campbell's eye when we told him that his neighbors still thought "somethin' mighty queer" was going on!

—DDZ

Pinhole Sunspots . . . by Walter Scott Houston

During the last three years our sun has been going through the greatest sunspot maximum yet recorded. More spots have appeared at this maximum than at any of the previous 11-year peaks of solar activity. On more than a half-dozen days the largest spots and spot groups have been visible to the naked eye.

It is possible for the amateur or the classroom instructor to demonstrate these large spots to a group or school class by turning a room into a huge pinhole camera. All that need be done is to darken the room and let the sunlight pass through a small, round hole in the window shade. (A large piece of cardboard can be substituted by those who quake before irate housewives or school janitors.)

The hole should be as round and as smooth as possible but, its size will depend on the length of your "throw" — try a variety of holes from ⅛" to ½". Too large a hole makes for a brighter image but a fuzzy one lacking in definition. Too small a hole affords sharpness but insufficient light. I use a throw of about 30 feet, performing the demonstration either in the early morning or late afternoon when the sun is low. A hole approximately ⅛" in diameter performs well at this distance.

Project your solar image on a clean, smooth white surface — paper, art board, plaster, or even a beaded movie screen. If the texture of the projection surface interferes with a clear view, jiggle it a bit and the image will improve.

Any sunspot or sunspot group visible to the naked eye will be evident with this pinhole projection. The method is also effective for viewing the partial phases (and the total phase for those fortunate few) of the October 2 eclipse of the sun. The sun will be quite low in the east and well-placed for this type of observation. Under no circumstances should you view the sun directly through an unprotected telescope or binocular.

Incidentally, for those with a thirst for computation, the image of the sun in such a pinhole projector is about 1/100th the length of the throw. That is, if the distance from the pinhole to the screen is 200 inches, the sun's diameter on the screen will be 2 inches.

During the last year I have used this method of showing large spots with considerable success and with no cost whatsoever — an uncommon combination for the amateur.

(Mr. Houston's name is familiar to readers of many astronomical publications, including his own, THE GREAT PLAINS OBSERVER. *We know Mr. Houston too well to suggest what course his future contributions might take, but we do know that his long and varied experience in astronomy should make them of great interest. Mr. Houston is a professor at Kansas State College, Manhattan.)*

SKYSCOPE

A 3½"-diameter reflecting astronomical telescope — 100% American-made. Completely mounted. Used by individuals, schools and universities for more than 20 years. Unconditionally guaranteed.

COMPLETE AS ILLUSTRATED

$29.75 f.o.b. Brooklyn

(Includes heavy, unbreakable tripod and a 60-power eyepiece)

Extra eyepieces (125 and 35 power) and a 6-power finder are also available.

SKYSCOPE still remains the very best value by any comparison.

Write for free descriptive brochure showing photographs of all component parts.

THE SKYSCOPE CO., INC.

P.O. Box 550
Brooklyn 28, New York

Important!

The new Monthly Evening Sky Map, which begins bi-monthly publication in 1960, will carry at that time a new subscription rate of $3.00 per year, $5.00 for two years, and $6.00 for three years. However, both new subscriptions and renewals will still be accepted at the **current** rate—$2.00 per year, $3.50 for two years, and $5.00 for three years—until **Dec. 31, 1959.**

THE
Monthly Evening Sky Map

NEW YORK, AUGUST 1909.

MARS.

Drawing by Prof. Barnard, September 2, 1894, with the 36 inch Lick Telescope.

(Sky Map of 1909—50 Years Ago!)

Subscribe now and be ready for the new features and the extensive coverage of celestial events in 1960.

Send Check or Money Order to: MONTHLY EVENING SKY MAP
Box 213 (Clayton Branch)
St. Louis 5, Missouri

THE HEAVENS WITHOUT A TELESCOPE
PLANET TABLES
THE BARRITT-SERVISS STAR AND PLANET FINDER
HOLD THE MAP OVER YOUR HEAD-THE TOP NORTH AND YOU WILL SEE THE STARS JUST AS THEY APPEAR IN THE HEAVENS

THE BARRITT-SERVISS STAR AND PLANET FINDER

Time-tested for half a century . . .
Clearest and most useful . . .
Complete with Planet Tables . . .

Truly "the stars brought down to earth." Designed by Leon Barritt and Garret P. Serviss in 1906, the many features and uncluttered design of this star finder have withstood the test of time. Ecliptic coordinates and accompanying Planet Tables enable you to attach sun, moon and planet discs and see the skies as they actually appear . . . tonight . . . next week . . . or next year.

Ruggedly constructed . . . 15 inches square . . . includes Planet Tables and attachable planet discs. Available for both Northern **and** Southern Hemispheres—please specify.

Price . . . either model . . . $6.95 (Postpaid)

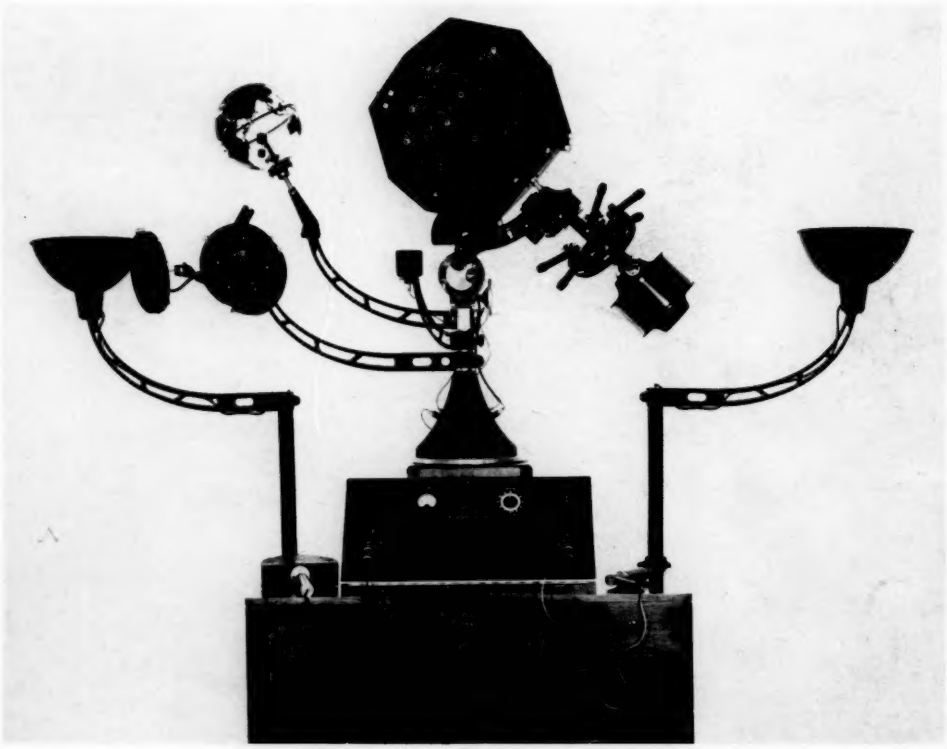
SKY MAP PUBLICATIONS, INC.
Box 213 (Clayton Branch)
St. Louis 5, Missouri

XUM

XUM

Before man goes into space . . .

Space must come to man!



THE **SPITZ** STANDARD PLANETARIUM

Makes the Vision of Tomorrow the
Reality of Today.

SPITZ LABORATORIES, INC.

YORKLYN, DELAWARE

XUM